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Editorial

Special Issue: Eco-Novel Food and Feed

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Abstract: Tendencies in food and feed industries deal with a permanent need to develop innovative products, tailored to consumer demands and, in the near future, to scarcity of food resources. Sustainable food production and food products as health and wellness promoters, and the use of alternative ingredients or by-products in designed thought food or feed formulations following circular economy principles, are hot topics that act as driving forces for innovation. This special issue offers a comprehensive forum for exchanging novel research ideas or empirical practices covering discussions from healthy foodstuffs enriched with functional ingredients, with special emphasis on those targets for populations with specific requirements, to consumer attitudes towards new ingredients and end products.

Keywords: consumer acceptance and attitude; food for groups with special requirements; health and wellness promoters; innovation; product development; sustainability and economic viability

1. Introduction

Nowadays, the development of healthy foods enhanced with functional ingredients rose considerably as the relation between diet and health became a priority for consumers. Sustainability in the production of food or feed ingredients and economic viability of their production and subsequent transformation into commercially well-accepted final products are dramatically relevant for the progress of the industry with an essential role on the economy. The methodologies for food or feed product development are currently based on the chemical, nutritional and mechanical features, accompanied with a sensorial analysis of the final product. Moreover, the structure of foodstuffs is demonstrated to be decisive for food appeal and strongly impacts consumers' acceptance. In the creative process, the food biopolymers are the major players for the creation of relevant food structures such as foams, emulsions or gels. The development of products tailored to the needs of specific target groups like people with food intolerances, babies, elderly people, athletes or even astronauts, who often require appropriate nutritional solutions, by using biopolymers, as well as the use of food industry by-products as source of these structuring macromolecules, along with the structural implications of adding novel ingredients, are some of the challenges in creating novel food or feed products. Lastly, consumer attitude towards new products is a critically relevant concern for the accomplishment of the novelties and should be considered for close to market novel products.

2. Contributions

The papers included in this special issue cover discussions on: Food neophobia or distrust of novelties?; Exploring consumers' attitudes toward GMOs, insects and cultured meat; Increased

grain amino acid content in rice with earthworm castings; Antihypertensive peptide activity in Dutch-type cheese models prepared with different additional strains of *Lactobacillus* genus bacteria; Increased anti-inflammatory effects on LPS-induced microglia cells by *Spirulina maxima* extract from ultrasonic process; A novel way for whey: Cheese whey fermentation produces an effective and environmentally-safe alternative to chlorine; Wheat bread with dairy products technology, nutritional and sensory properties; or *Psyllium* and *Laminaria* partnership—an overview of possible food gel applications. The editors acknowledge all contributions, and we are delighted to introduce a collection of seven selected high-quality research papers in this Special Issue.

Facio and Fovino [1] presented a comprehensive review on the challenges the food industry continually faces to find new ideas to satisfy the increasingly specific consumer demand, since innovative food products do not always become part of consumption habits or create a real market. They stated that one of the major sources of resistance to novelty lies in the attitude of the consumer, who in many cases may be suspicious or hostile as a result of specific ideologies, overly attached to tradition or affected by neophobia, which was discussed throughout the paper. Moreover, they reviewed the recent literature on Europeans' attitude toward novel foods and innovation, including genetically modified organisms, cultivated meat and insects as food, which revealed a number of paradoxes in consumers' behavior, and in the many complex conditions underpinning the success of innovation in food production. Consumer involvement in the early stages of the development process is one of the strategies aimed at minimizing the failure of new products when they reach the market.

Huang and coworkers [2] contributed with a brief report on the nutritional value of rice to enhance the health of rice consumers, indicating that grain amino acid content is an important nutritional component. This study was conducted to test the hypothesis that the application of earthworm castings could increase the grain amino acid content in rice. Their outcomes showed that total amino acid content in the grain was significantly elevated by applying earthworm castings, with an average increase of 8% across four tested rice cultivars. These authors suggested that this behavior can be related to improving the efficiency of the nitrogen to amino acid conversion, and highlighted that further studies are required to assess the effects of earthworm castings on the amino acid metabolism in rice grains.

Garbowska and coworkers [3] focused on the proteolytic activity of bacterial strains from the genus *Lactobacillus* and their capability in producing peptide inhibitors of angiotensin-converting enzyme in cheese models prepared with their addition. These authors indicated that all tested cheese models exhibited a high ability of angiotensin convertase inhibition (>80%, after five weeks of ripening). They also found that use of the adjunct bacterial cultures from the genus *Lactobacillus* contributed to lower IC_{50}. In addition, they pointed out that the proteolytic activity of model cheeses varied in their increase through the period of ripening, with changes in values dependent on the adjunct lactic acid bacteria strain used for cheese making.

Choi and coworkers [4] assessed the anti-inflammatory impact of *Spirulina* extract from a non-thermal ultrasonic process. These authors found that this environmentally friendly treatment enhanced anti-inflammation activities two-fold compared to those of conventional extracts processed at high temperature. They proved that ultrasound extraction also showed relatively low cytotoxicity against murine microglial cells and inhibited the production of the inflammatory mediators, NO and PGE_2. The authors also proved that ultrasound extraction effectively suppresses both mRNA expression and the production of proinflammatory cytokines, such as TNF-α, IL-6 and IL-1β, in a concentration-dependent manner. This study also provided useful information for developing functional foods from heat-labile natural resources.

Santos and coworkers [5] developed a low-cost, scalable fermentation protocol to produce a disinfectant from whey (a cheese by-product/dairy waste) with high levels of lactic acid and antimicrobial peptides produced by lactic acid bacteria. They showed that the established fermentation for industrial whey held strong potential as an effective disinfecting agent when applied to lettuce, with better results than 110 ppm chlorine solution. Other advantages were that it did not alter the

quality parameters of the shredded loose-leaf lettuce, did not notably affect the color, and panelists were not able to discriminate from chlorine treatments. The authors stated that fermented whey was indeed as effective as chlorine, but also corroborated that their technology of whey fermentation was effective in maintaining the quality of lettuce throughout storage.

Graça and coworkers [6] assessed dairy products as an innovative alternative to enhance the functional and nutritional value of bakery products. Specifically, they studied the addition of yoghurt and cheese curd to wheat bread. These authors found that the yoghurt or cheese additions had a positive impact on the rheology characteristics of the dough. They stated that these enriched breads showed a significant improvement on the nutrition profile, which is important to balance the daily diet in terms of major and trace minerals, and which is critically relevant for health enhancement and maintenance. Moreover, they found good sensorial acceptability for breads with 50 g of yoghurt and 30 g of cheese curd.

Fradinho and coworkers [7] focused on seaweeds as a novel source of important nutritional compounds with interesting biological activities for being processed into added-value products. In this study, two previously developed products obtained by *Laminaria ochroleuca* brown seaweed processing (liquid extract and a purée-like mixture) were processed with *Psyllium* gel to develop functional hydrogels. The optimization of the formulation and the characterization of the *Laminaria–Psyllium* gels in terms of their mechanical features have allowed the proposal of potential food applications. Authors found a beneficial interaction between *Laminaria* and *Psyllium* in terms of the reinforcement of texture and rheological properties, which could provide new healthy gelling formulations with attractive properties to alleviate the growing market demand of eco-novel food matrices.

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